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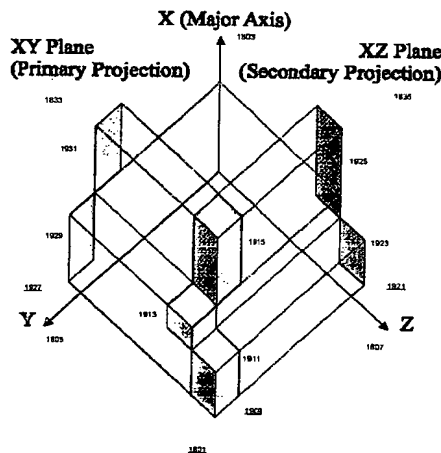
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(54) Title: USING RUNS OF CELLS TO TRAVERSE A RAY THROUGH A VOLUME



(57) Abstract: Line drawing techniques (Figure 19) that employ runs (1929) or runs of runs of pixels (1929, 1931) to draw the line (1929, 1931) compute line structure information that they use to determine the sequence of runs in the line. This line structure information may be used to compute the positions of a plurality of the runs and then draw the runs in parallel. The line drawing techniques may be also be used with rays in three-dimensions (1803, 1805, 1807). Projections of the ray are made on planes (1833, 1835) that intersect each other on the ray's major axis (1803). The line drawing techniques are used to determine cells in the planes (1929, 1931, 1923, 1925) that are intersected by the projections. The voxels (1913) intersected by the ray are then determined using the cells (1929, 1925). Runs of voxels (1911) in the ray are used in ray traversals. The volume traversed by the ray is subdivided into encoding runs of voxels (1911, 1913, 1915) that may include one or more significant runs containing voxels whose data will affect the ray. Traversal is done by determining for each run of voxels (1911, 1913, 1915) in the ray whether any of the voxels in the ray run are also in a significant run.

INTERNATIONAL SEARCH REPORT

 International application No.
PCT/US03/00240

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06T 17/00

US CL : 345/424, 419

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 345/424, 419

 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
GALLAGHER, COMPUTER VISUALIZATION, CRC PRESS, 1995

 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
ACM, IEEE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| X | SCHRODER ET AL. Data Parallel Volume Rendering as Line Drawing, ACM, 1992, pages 26-28 | 1, 2, 3, 6, 10, 11 |
| A | KAUFMAN ET AL. 3D Scan-Conversion Algorithms for Voxel-Based Graphics, ACM, 1986, pages 52-58 | 1-18 |
| A | LEVOY Efficient Ray Tracing of Volume Data, ACM, 1990 pages 249-253 | 1-18 |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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|---|--|
| * Special categories of cited documents: | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
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